

# PATENT SPECIFICATION

(11) 1 484 613

1 484 613

(21) Application No. 46577/74 (22) Filed 28 Oct. 1974

(31) Convention Application No. 2 354 100

(32) Filed 29 Oct. 1973 in

(33) Fed. Rep. of Germany (DT)

(44) Complete Specification published 1 Sept. 1977

(51) INT CL<sup>2</sup> G01N 21/22

(52) Index at acceptance

G1A 247 248 269 357 358 369 400 403 404 406 407 409 40X

447 448 449 457 458 459 469 472 476 478 47X 480

49X 520 52Y 53Y 580 581 589 58Y 590 591 599

59Y 622 761 762



## (54) WINDSCREEN SOILING SENSOR

(71) I, GERHARD KARL, a Citizen of the Federal Republic of Germany, of 4 Uppental, 8701 Frickenhausen, Federal Republic of Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a windscreen soiling sensor.

The invention provides a windscreen soiling sensor having a light source which transmits a light onto the windscreen outer surface through a prism and the windscreen, and a light meter which registers the light reflected at the outer surface through the windscreen and a further prism at an angle equal to or greater than the critical angle when the windscreen is clean, and a signal generator responsive to a change in the output of the light meter, characterised in that the light source, the light meter and the prisms are mounted in a common housing the light beam reflected from the outer surface being selected by an optical system and a diaphragm and being focussed onto the light meter, the prisms being fastened by means of transparent adhesive to the windscreen and the adhesive as well as the prisms have the same or substantially the same reference index as the windscreen.

The second prism emerging beam of light can be made up of a plurality of small prisms, so that a generally flat structural shape is achieved.

In order to enlarge the illuminated measuring surface on the windscreen, the light emitted from the light source can furthermore be totally-reflected a number of times in the windscreen. Optical adjustment of the device subsequent to incorporation thereof into a motor vehicle is not necessary, since the paths of the rays from the light source is already fixed in the device itself.

The invention will be described further by

way of example with reference to the accompanying drawing in which the single figure is a diagrammatic sectional plan illustrating a preferred embodiment of the device of the invention.

In the drawing, light from a light source 1 is fed through an optical focussing system 8 (for maximum light yield) to a prism 9 and a mirror 10 and is thereby directed as a beam onto soillable surface 2 of transparent windscreen 21. The totally-reflected light emerges, through a prism plate 11, from the windscreen and is focussed by an optical system 12 onto a photometer 7 having a diaphragm or iris 6. The use of prisms 9 and 11 is necessary because the beam of light has to impinge at, an angle equal to or greater than the critical angle onto the surface 2 of the windscreen 21 when it is clean. It is reflected at the same angle  $\alpha$  T.

The photometer 7 generates a specific signal in the case of undisturbed total reflection which represents a good zero point value. Upon variation of the intensity of the reflected light, for example through drops 3 of water, or solid particles 4 of dirt, the photometer 7 generates a new signal and forward same to a signal generator (not shown) which is set to operate if the signal from the photometer deviates by a certain amount from the zero point value. If this occurs, a signal is transmitted which switches on any desired device serving for cleaning the windscreen. In this respect it is material that such a measuring of a totally reflected light beam and of its intensity changes takes place completely uninfluenced by daylight fluctuations and moreover requires a very small light source 1.

To avoid refraction and reflection, the prisms and the adhesive or bonding between the parts have the same or a substantially the same refractive index.

To enlarge that part of the surface on the windscreen which is illuminated, the prisms 10 and 11 are spaced apart. Multiple total

50

55

60

65

70

75

80

85

90

reflection can then take place in the wind-  
screen, so that the illuminated measuring  
surface on the windscreen is enlarged. The  
probability that a beam totally-reflected a  
number of times encounters a drop of water  
or a particle of dirt and is disturbed in its  
intensity is in this connection considerably  
increased.

A housing surrounding the necessary  
electrical and optical parts is thus in natural  
size comparatively small.

The described windscreen soiling in-  
dicator thus comprises only a few, small  
structural parts which are scarcely  
susceptible to trouble. The sensor works  
always exactly and uninfluenced by varying  
stray light and can along with the use of  
transparent adhesives with corresponding  
optical properties very easily also be  
adhered to windscreens.

#### WHAT I CLAIM IS:—

1. A windscreen soiling sensor having a  
light source which transmits light onto the  
windscreen outer surface through a prism  
and the windscreen, and a light meter which  
registers the light reflected at the outer  
surface through the windscreen and a  
further prism at an angle equal to or greater  
than the critical angle when the windscreen

is clean, and a signal generator responsive to  
a change in the output of the light meter,  
characterised in that the light source, the  
light meter and the prisms are mounted in a  
common housing the light beam reflected  
from the outer surface being selected by an  
optical system and a diaphragm and being  
focussed onto the light meter, the prisms  
being fastened by means of transparent  
adhesive to the windscreen and the adhesive  
as well as the prisms have the same or  
substantially the same refractive index as  
the windscreen.

2. A windscreen soiling sensor as claimed  
in Claim 1 or 2 characterised in that the  
prism for the beam of light leaving the  
windscreen is made up of a plurality of small  
prisms.

3. A windscreen soiling sensor sub-  
stantially as hereinbefore described with  
reference to and as illustrated in the ac-  
companying drawing.

For the Applicants,  
BARLOW, GILLET & PERCIVAL,  
Chartered Patent Agents,  
94, Market Street, Manchester, 1,  
and  
20, Toaks Court, Cursitor Street,  
London, E.C.4.

**1484613      COMPLETE SPECIFICATION**  
**1 SHEET**      *This drawing is a reproduction of  
the Original on a reduced scale*

**1484613      COMPLETE SPECIFICATION**  
**1 SHEET**      *This drawing is a reproduction of  
the Original on a reduced scale*

**1484613      COMPLETE SPECIFICATION**  
**1 SHEET**      *This drawing is a reproduction of  
the Original on a reduced scale*

**1484613      COMPLETE SPECIFICATION**  
**1 SHEET**      *This drawing is a reproduction of  
the Original on a reduced scale*

